JPRS 70248

30 November 1977

USSR

EAST EUROPE

USSR AND EASTERN EUROPE SCIENTIFIC ABSTRACTS

ENGINEERING AND EQUIPMENT

No. 37

U. S. JOINT PUBLICATIONS RESEARCH SERVICE

NOTE

JPRS publications contain information primarily from foreign newspapers, periodicals and books, but also from news agency transmissions and broadcasts. Materials from foreign-language sources are translated; those from English-language sources are transcribed or reprinted, with the original phrasing and other characteristics retained.

Headlines, editorial reports, and material enclosed in brackets [] are supplied by JPRS. Processing indicators such as [Text] or [Excerpt] in the first line of each item, or following the last line of a brief, indicate how the original information was processed. Where no processing indicator is given, the information was summarized or extracted.

Unfamiliar names rendered phonetically or transliterated are enclosed in parentheses. Words or names preceded by a question mark and enclosed in parentheses were not clear in the original but have been supplied as appropriate in context. Other unattributed parenthetical notes within the body of an item originate with the source. Times within items are as given by source.

The contents of this publication in no way represent the policies, views or attitudes of the U.S. Government.

PROCUREMENT OF PUBLICATIONS

JPRS publications may be ordered from the National Technical Information Service, Springfield, Virginia 22151. In ordering, it is recommended that the JPRS number, title, date and author, if applicable, of publication be cited.

Current JPRS publications are announced in Government Reports Announcements issued semi-monthly by the National Technical Information Service, and are listed in the Monthly Catalog of U.S. Government Publications issued by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

Indexes to this report (by keyword, author, personal names, title and series) are available through Bell & Howell, Old Mansfield Road, Wooster, Ohio, 44691.

Correspondence pertaining to matters other than procurement may be addressed to Joint Publications Research Service, 1000 North Glebe Road, Arlington, Virginia 22201.

BIBLIOGRAPHIC DATA SHEET	1. Report No. JPRS 70248	2.	3. Recipient's Accession No.
4. Title and Subtitle USSR AND EASTERN EUROPE SCIENTIFIC ABSTRACTS - ENGINEERING AND EQUIPMENT, No. 37			5. Report Date 30 November 1977 6.
7. Author(s)			8. Performing Organization Rept. No.
9. Performing Organization Name and Address Joint Publications Research Service 1000 North Glebe Road Arlington, Virginia 22201			10. Project/Task/Work Unit No. 11. Contract/Grant No.
12. Sponsoring Organization Name and Address			13. Type of Report & Period Covered 14.

15. Supplementary Notes

16. Abstracts

The report contains abstracts and news items on aeronautical, marine, mechanical, automotive, civil and industrial engineering, related research and development, and engineering materials and equipment.

17. Key Words and Document Analysis. 17a. Descriptors

USSR
Eastern Europe
Aeronautics
Industrial Engineering
Marine Engineering
Stress Analysis
Turbines
Metrology

17b. Identifiers/Open-Ended Terms

17c. COSATI Field/Group 1A, 13H, 13J, 14B

18. Availability Statement	19. Security Class (This Report)	21. No. of Pages
Unlimited Availability Sold by NTIS Springfield, Virginia 22151	UNCLASSIFIED	39
	20. Security Class (This Page) UNCLASSIFIED	22. Price PCA03

FORM NTIS-35 (10-70) USCOMM-DC 40329-P71

JPRS 70248

30 November 1977

USSR AND EASTERN EUROPE SCIENTIFIC ABSTRACTS

ENGINEERING AND EQUIPMENT

No. 37

This serial publication contains abstracts of articles and news items from USSR and Eastern Europe scientific and technical journals on the specific subjects reflected in the table of contents.

Photoreproductions of foreign-language sources may be obtained from the Photoduplication Service, Library of Congress, Washington, D. C. 20540. Requests should provide adequate identification both as to the source and the individual article(s) desired.

CONTENTS PAGE

ENGINEERING

Accoustical and Ultrasonic..... 1
Construction..... 2
Heat, Combustion, Detonation..... 9
Materials..... 12
Metrology, Mapping, Surveying..... 16
Precision Optical and Mechanical..... 19
Stress Analysis and Stability Studies..... 20
Turbine and Engine Design..... 22

EQUIPMENT

Acoustical and Ultrasonic..... 23
Aeronautical and Space..... 24
Gyroscopic..... 25
Measuring Test Calibration..... 26
Power, Engine, Turbine, Pump..... 32

USSR

UDC 623.983.621.395.089.6

EXCLUSION OF THE INFLUENCE OF FIELD INHOMOGENEITY IN THE LOW-FREQUENCY CALIBRATION OF HYDROPHONES

Moscow IZMERITEL'NAYA TEKHNIKA in Russian No 4, 1977 pp 68-70

GOLENKOV, A. N.

[Abstract] The classical inertial calibration of hydrophones by the method of a column of oscillating fluid uses a determination of the depth of the layer of fluid H_1 from the plane of the acoustical center of the hydrophone, which does not coincide with the plane of geometric symmetry of the hydrophone. In an earlier work (TrudyVNIIFTRI--Proceedings of the All-Union Scientific-Research Institute of Physicotechnical and Radiotechnical Measurements--No 23(53) 1975) the author described an experimental determination of the depth of the acoustic center of a hydrophone in a column of oscillating fluid where an inhomogeneous field is generated with a constant gradient. However the inhomogeneous field of inertial forces can be used as a basis for calibrating the hydrophone even without a determination of the position of the acoustical center. This can be done by conducting only two experiments using precisely the same conditions except the height of the level of free surface of the fluid in the test chamber. The method involves a simplification of the form of the inhomogeneous field with constant gradient with depth and simplifies the determination of the dependence of the acoustical pressure on the coordinates, and the presence in all cases of a particular reference plane of free surface at which the pressure is equal to zero. Illustrations 3; bibliographies 6.

USSR UDC 69.057.3

DESIGNING AND TESTING BUILDINGS ERECTED BY THE LIFTING METHOD

Moscow BETON I ZHELEZOBETON in Russian No 5, 1977 pp 8-10

SAAKYAN, A. O., and SAAKYAN, R. O., Special Planning and Experimental Design Office, Ministry of Industrial Construction Armenian SSR

[Abstract] On the basis of research and experimental construction the authors give recommendations for designing 16- to 25-story buildings to be erected by the lifting method, the architectural planning and municipal planning possibilities and technical-economic advantage of the construction method for higher buildings with braced frame where the roll of collar beams is played by flat beamless ceilings, and the bracing element is the three-dimensional rigid core. Results are given of vibromachine field tests of dynamic characteristics. Use of shock-absorbing devices for increasing seismic stability is considered. These tests, conducted on 9- to 12-story buildings, showed that the periods and waveforms of the vibrations of the rigid core and frame are practically identical, which indicates that the structure acts as a single spatial unit. The ratio of the natural frequencies of the translational vibrations forms the series 1 : 3.4 : 6.3, and for torsional vibrations 1 : 3 : 5. With increased excitation forces the natural frequencies of the oscillations of the buildings are reduced, whereas the values of the logarithmic decrements of the oscillations are increased. Illustrations 3.

USSR UDC 624.078

PECULIARITIES OF THE PERFORMANCE OF COLUMN JOINTS WITH LATERAL CUTOUTS DURING ECCENTRIC COMPRESSION IN THE FRAMES OF INDUSTRIAL BUILDINGS

Moscow BETON I ZHELEZOBETON in Russian No 5, 1977 pp 26-29

MATKOV, N. G., Scientific-Research Institute of Concrete and Reinforced Concrete

[Abstract] A study was made of the performance of the joints of columns with shoulder cutouts with precompression in the erection and employment stages under loads close to the true loads for the frame of an industrial building. On the basis of the study some recommendations are given for computing the strength of eccentrically compressed joints of columns for the frames of multistory structures. It is shown that the joint can be loaded during erection until it becomes monolithic with complete use of the reinforcements. In the monolithic condition the joint under eccentric compression can be computed without the preloading being taken into account. Illustrations 4; table 1; bibliographies 4.

USSR UDC 627.824.33.004.1

NEW ENGINEERING SOLUTIONS IN THE CONSTRUCTION OF THE CHARVAK HYDROELECTRIC POWER STATION

Moscow GIDROTEKHNICHESKOYE STROITEL'STVO in Russian No 4, 1977 pp 5-7

ZHIGAREV, D. A., and SEMENIKHIN, A. D.

[Abstract] A brief description is given of the original engineering solutions applied in the design and construction of the Charvak Hydroelectric Power Station. The rock-earth dam 760 meters long at the crest was built to provide electric power and to irrigate 145 thousand hectars of land in Central Asia and went into use in 1973. The penstocks are 9 m in diameter and 770 and 852 m long. The powerhouse has four hydrosets of radial-axial turbines with 4.1-m diameter rotors and hydraulic generators rated at 176.5 thousand kva and 187.5 rpm. The dam had to withstand up to 8-ball earthquakes which necessitated the use of very large prismatic retaining walls at the sides, other design considerations and the use of over 1,000 measuring devices for constant monitoring of the slightest deformations of the body of the dam, discharging and other equipment. Bibliographies 3; illustrations 3.

USSR UDC 627.824.3: 624.152.5

CUTOFF TRENCH UNDER THE CENTRAL CORE OF THE NUREK DAM

Moscow GIDTROTEKHNICHESKOYE STROITEL'STVO in Russian No 4, 1977 pp 7-9

BONDAR', I. YA., BAGDASAROV, A. G., and YEROFEYEV, YE. V.

[Abstract] A description is given of the method used at Nurek for constructing the cutoff trench under the core by blasting from underground workings. Because of the complex relief at the site, the difficulty in making access along the horizontal, and difficult working conditions, a one-time cave-in by explosion method was employed. The lateral approach and disposition of explosive charges are illustrated. A total of 1,544 bores were drilled (732 loose bores and 812 line bores) over a total distance of 41,680 meters. The explosion was detonated in Nov 1975; and the heap was removed in three months' time (large area of rubble allowed use of several excavators at the same time). Volume of the cave-in was 175,800 m^3; the adit trenching volume was 3,558 m^3; the total amount of explosives used was 99,746 kg (0.57 kg/m^3), and the single blast cost 493.48 rubels. Illustrations 2.

USSR UDC 556.555.6.001.5

FORMATION, PROPAGATION, AND STRUCTURE OF THE DENSE BOTTOM FLOW IN THE NUREK RESERVOIR

Moscow GIDROTEKHNICHESKOYE STROITEL'STVO in Russian No 4, 1977 pp 9-13

PYRKIN, YU. G., PETROV, V. P., and SAMOLYUBOV, B. I.

[Abstract] An analysis is made of the results of studies of the velocity distribution of the flow and turbidity of the water in the head bay of the Nurek reservoir in the area where a turbid bottom flow generates and propagates. The steady-state density of flow and its kinematic structure are examined; the silting characteristics of the reservoir in the low-water-level period are given on the basis of 1974-1975 data. Plots of the dependence of flow thickness, turbidity, and velocity on distance show that the formulas given here can be applied for practical calculations. Illustrations 5; bibliographies 3.

USSR UDC 627.83.00142

FIELD AND LABORATORY STUDIES OF CAVITATION IN THE DISCHARGE OUTLETS AT THE BUKHTARMA HYDROELECTRIC STATION

Moscow GIDROTEKHNICHESKOYE STROITEL'STVO in Russian No 4, 1977 pp 28-32

ZHAROV, N. I., IVOYLOV, A. A., and SHUMKOV, R. V.

[Abstract] Results are given of comparative field and laboratory studies of cavitation in the "ski-jump" configured spillway at Bukhtarma. Certain problems are studied with respect to predicting cavitation phenomena for various physical conditions of the water in nature and in the experimental models. The differences (air-saturation, chemical composition, presence of undissolved impurities in the water, etc) are found to be negligible if the vacuum-cavitation type installation is used in the laboratory study. The "ski-jump" configuration is shown to be unfavorable in respect to both possible deformations and cavitation build-up. The unfavorable situation is best aleviated by diversion of the flow or by altering the streamlined configuration of the spillway. Illustrations 5; bibliographies 2.

USSR UDC 624.122.35: 627.8.001.4

CONSTRUCTION OF THE EXPERIMENTAL DAM ON THE BURLYKIYA RIVER

Moscow GIDROTEKHNICHESKOYE STROITEL'STVO in Russian No 5, 1977 pp 15-20

KUPERMAN, V. L., KORNAKOV, G. I., and KORCHEVSKIY, V. F.

[Abstract] For the erection of the Kambaratinsk hydrostation rock dam, preliminary experimental explosions were used as directional explosions which simulated the process of construction under natural conditions. The main problems of the experiment were: refining the calculated parameters of the massive explosion; studying the geotechnical properties of the heap of blast-fragmented rock and development of methods of predicting these properties; and estimating the effect of the explosion on the state of preservation of the massif and of the structures. In 1973 the Central Asian Department of the All-Union Planning, Surveying and Scientific-Research Institute (Gidroproyekt) completed a feasibility study of the Kambaratinsk Hydroelectric Power Station on the Naryn River as a 2-million-kilowatt facility. The main construction undertaking was to be the high (300 m) rock dam formed by directional blasting. Originally 687 tons of granulite were to be detonated; in the working plans this was increased to 703 tons; powdered granulite 79/21 was to be used as the detonator. By 1974 all the required engineering-geological, geophysical and seismic studies had been completed. The preparatory work was completed at the end of January 1975, and at 1300 hours local time on 8 Feb 1975 the explosion was detonated. Unfortunately four days before the blast the air temperature dropped sharply, and the river channel froze to a depth of 1-1.5 m, which had a detrimental affect on the results of the blast, which produced a dam 50 m high and 330 m long at the crest with an embankment volume of approximately 300 thousand m^3. Experimental filling of the reservoir began in March and terminated at the end of June 1976. Partial manipulation of the gates destroyed their watertight integrity, which precluded raising the level to stabilization. The maximum lead was 35 m, and filtration reached 2.3 m^3/sec, which corresponds to a filtration coefficient of 600 m^3/day (turbulent mode) for the entire body of the dam; in the central parts of the dam the filtration coefficient did not exceed 250-300 m^3/day. Further studies are to be made to determine the nature of the filtration deformations under extended use of the dam at maximum head. Illustrations 3.

USSR UDC 624.122.35: 627.8.001.4

CHANGE IN CONDITIONS OF ROCKS AFFECTED BY LARGE-SCALE BLASTS

Moscow GIDROTEKHNICHESKOYE STROITEL'STVO in Russian No 5, 1977 pp 29-32

KAGAN, M., and ANDRIANOV, A. V.

[Abstract] The authors consider the changes in the engineering-geological conditions of rocks affected by an explosion of very high force. Patterns of change of cracking and of the properties of surrounding rock with distance from the detonation are explained for various engineering-geological zones and subzones. The influence of the explosion on the stability of underground structures of various sizes and methods of attachment is estimated. Explosive effects are divided into two zones for strong effects and weak effects. For a 100-ton charge the zone of strong effects is about 30 meters thick, and 45 meters thick for a 500-ton charge; the zone of weak effects is somewhat thicker. On the line portion of the Kambaratinsk hydroelectric station the zone of strong effects was nearly 100 m thick. Within the zones of strong explosive effects the change of the rock involves the formation of new cracks up to one meter wide (on the surface) and an enlargement of existing cracks; in the zones of weak effects there is a widening of existing cracks and fine cracking. Illustrations 5; table 1; bibliographies 4.

USSR UDC 624.122.35: 627.8: 550.834.001.4

INSTRUMENT OBSERVATIONS OF THE MECHANICAL AND SEISMIC AFFECTS OF THE EXPLOSION ON THE BURLYKIYA RIVER

Moscow GIDROTEKHNICHESKOYE STROITEL'STVO in Russian No 5, 1977 pp 32-35

ADUSHKIN, V. V., FOMICHEV, A. G., KONDRAT'YEV, S. V., LIBIN, V. YA., LAVRINENKO, V. L., PERNIK, L. M., and SVINTSOV, I. S.

[Abstract] Results are given of measurements with instruments of the main parameters of the automatic effect of the large-scale explosion for constructing a dam on the Burlykiya River. The system for automatic switching of apparatus is described. The rate of motion of the blast-ejected rock fragments was observed by motion picture records. Both the seismic and air-shock waves were recorded. The actual intervals of delayed action and the sequence of explosion of charges were ascertained. The main stages of construction of the dam are explained. The air-shock wave recorders had sensitivities of 0.007 kg/cm^2 and 0.02 kg/cm^2 per mm of recording. The S5S seismic recorders revealed the parameters of the seismic waves at distances from 0.1 to 1 km with an average sensitivity of 125 mv/(cm/sec) and a 5-sec period of natural oscillation of the pendulum. More than fifty S5S seismic recorders were used. The explosion involved five successive blasts of charges weighing 2.3, 88, 125, 470, and 18 tons at intervals of 35, 162, 190, and 280 msec respectively.

Motion picture studies showed the maximum rate of escape of explosion gases at 450-500 m/sec. The maximum rate of rise of the dome of rock at the epicenter on the left bank was 15-20 m/sec, and on the right bank 25-30 m/sec. Illustrations 7; tables 3.

USSR UDC 624.042.8: 539.41

PROBLEMS OF EXPLOSION SAFETY IN INDUSTRIAL BUILDINGS. LOADS AND CALCULATION OF STRUCTURAL DESIGNS

Moscow STROITEL'NAYA MEKHANIKA I RASCHET SOORUZHENIY in Russian No 2, 1977 pp 9-16

RAZDOL'SKIY, L. G., and CHERNOV, YU. T.

[Abstract] On the basis of the literature (64-item bibliography) the authors discuss first the works devoted to a general discussion of the problems of safety measures against explosions in industrial buildings, physics of combustion of gas-vapor-dust mixtures, and structural designing of buildings where the danger of explosion is present. They then discuss the results of works on the experimental and theoretical study of structural elements exposed to intensive dynamic effects, including the inelastic stage of deformation of structures, and the behavior of materials and specimens during very high rates of deformation. It is shown that reinforced concrete structures should be considered in two classes: those that will retain structural integrity after a single explosive loading, but will have such a degree of permanent deformation as to make them not available for further use; and those that will withstand repeated brief explosive overloads and retain load bearing capacity even though not readily suitable for further use. Bibliographies 64.

USSR UDC 624.04: 539

LINEAR MODEL OF AN IDEAL FREQUENCY-INDEPENDENT INTERNAL FRICTION

Moscow STROITEL'NAYA MEKHANIKA IS RASCHET SOORUZHENIY in Russian No 2, 1977 pp 28-31

TSEYTLIN, A. I., Central Scientific-Research Institute of Structural Designs, Moscow

[Abstract] A linear hereditary model is given for frequency-independent internal friction that satisfies the principle of causality. It is shown that such a model exists in a class of physically real linear systems, and that the force of internal resistance (elastic and inelastic) should in this case be described by a fractional differential operator. Precise values are given

for the parameters of the complex rigidity, that are used in calculating the damping in accordance with the complex hypothesis. This model may be used for solving dynamic problems that arise during a calculation of structural designs as well as for the analysis of the results obtained on the basis of various linear models of "nearly" frequency-independent internal friction. It provides a correct solution of the equations of motion of the problems in question for any dynamic effects that do not contain static components. Figures 2; bibliographies 10.

USSR UDC 621.18.001.5

COMPUTING THE PERIODIC PROCESSES IN ELEMENTS OF STEAM GENERATORS IN ACCORDANCE WITH A NONLINEAR MATHEMATICAL MODEL

Moscow IZVESTIYA AN SSSR ENERGETIKA I TRANSPORT in Russian No 2, 1977 pp 126-133 manuscript received 31 Mar 75 revised 5 May 1976

KHOR'KOV, N. S., and SHTERNFEL'D

[Abstract] For obtaining the dynamic characteristics according to linear mathematical models which describe the nonstationary processes in boiler installations the authors propose the use of the method of integral relations, which has a number of advantages over other methods more frequently used in engineering practice. An algorithm and program are given for obtaining the transient processes for the case of deep-seated perturbations. The computed curves are compared with experimental curves obtained on the test stand at the All-Union Institute of Heat Engineering. The mean deviation of the computed curves from the experimental is 6%, and maximum 10% close to the critical point. The method of integral relations affords the possibility of solving the boundary-value problem and taking the influence of the equation of motion into account, which is not possible with iteration processes. Illustrations 4; bibliographies 10.

USSR UDC 532.529.5

THREE-DIMENSIONAL ANISOTHERMICITY OF PARTICLES IN MIXED-PHASE FLOWS

Moscow IZVESTIYA AN SSSR ENERGETIKA I TRANSPORT in Russian No 2, 1977 pp 134-143 manuscript received 30 Dec 1975

GARKUSHA, V. I., and STASENKO, A. L.

[Abstract] A numerical study is made of the heat conductivity inside various spherical particles and the dynamic problem of acceleration or deceleration of the particles by a spherically symmetrical flow of gas. Mean three-dimensional and isothermic temperatures are compared for various heat conductivities of the material of the particles. The numerical estimate of the characteristic times of various relaxation processes showed that the problem of heat conductivity for the particles moving in a gas is directly connected with the dynamics of the particle. A numerical solution is obtained for the joint problem of the dynamics and heat conductivity of particles moving in a spherically symmetrical flow of gas. The results obtained confirm the generally used presumption of the isothermicity of the particles when only the heat content of the phase is studied. However, when highly nonlinear surface processes (radiation, phase transitions, ionization of gas molecules) or internal stresses are taken into account the joint solution of the dynamics and heat conductivity of the particles becomes mandatory. Illustrations 5; bibliographies 19.

USSR

UDC 652.997: 537.22

STUDY OF THE CHARACTERISTICS OF CONVECTIVE HEAT TRANSFER IN CYLINDRICAL SOLAR RECEIVERS ON THE BASIS OF THE SOLUTION OF THE CONJUGATE PROBLEM OF HEAT EXCHANGE

Tashkent GELIOTEKHNIKA in Russian No 2, 1977 pp 56-63 manuscript received 16 Sep 1976

ROZHKOV, I. A., and GRILEKHES, V. A.

[Abstract] A study is made of the convective heat exchange during a laminar flow of a fluid in a flat duct with a non-uniform heat conductor on one side. The influence of the heat conductivity of the wall, change of Reynolds number in the laminar region and of the maximum value of the heat flux on the Nusselt number is shown. Approximate dependences of the Nusselt number on the length of the duct obtained for the nonuniform heat conductor can be used in the heat engineering calculations of cavity-type high-temperature cylindrical solar receivers with characteristic heat flux distributions of $q(x)_{max} = 2.7 \cdot 10^4$ to $5 \cdot 10^5$ w/m^2 during a laminar flow mode of the heat carrier. Illustrations 6; bibliographies 7.

USSR UDC 662.997.004.14

ANALOG ALGORITHMS AND THEIR REALIZATION ON THE COMPUTER FOR COMPUTING THE CAPACITY OF THE ACCUMULATING DEVICES OF WIND AND SOLAR POWER STATIONS

Tashkent GELIOTEKHNIKA in Russian No 2, 1977 pp 75-83 manuscript received 12 Jun 1976

SALIYEVA, R. B., Tashkent Electrotechnical Institute of Communications

[Abstract] The fact that the productivity of wind and solar power stations varies greatly in accordance with the variation of wind and solar radiation modes, which can be interpreted as continuous stochatic processes, and rarely coincides with the customer demand for productivity, indicates that without organized regulation of the productivity of wind and solar stations the prospects for using the energy of the wind and sun are very limited. The energy storage capacities thus are of great importance. This work deals with a method of computing the capacity of the storage devices, on the basis of a mathematical model of which a statistical model is obtained. For simulating the calculations on the computer the corresponding analog algorithms are constructed, which provide a means of determining the capacity of the storage facilities, the total productivity, waste of unutilized production, energy deficit, and other characteristics. Block diagrams of the algorithms are given. Illustrations 4; bibliographies 6.

USSR UDC 691.327: 536.485

INFLUENCE ON FROST RESISTANCE BY THE UNBURNED FUEL IN THE ASH ADDED TO SAND CONCRETES

Moscow BETON I ZHELEZOBETON in Russian No 5, 1977 pp 29-30

VOLZHENSKIY, A. V., Dr Technical Sciences, Professor, GOL'DENBERG, L. B., Engineer, Moscow Institute of Construction Engineering, and VOYEVODA, G. F., Design-Technological Office, Mosorgstroy-materialy

[Abstract] Studies at the Moscow Institute of Construction Engineering and other facilities showed that adding ashes throughout a cement-sand mixture, that is steam-cured, can produce concrete of grades M 200-300 with the same amount of cement used for ordinary concrete in accordance with SN 386-74. The dispersion of the brown-coal ash should not be more than 3,000 cm^2/g, and of the hard-coal ash 4,000 to 4,500 cm^2/g. A study of the influence of the unburned fuel in the ash added to sand concretes showed that in the ash additives prepared by the burning of hard coals losses of ignition in the cements of up to 20% had no essential influence on the frost resistance of the concretes. Illustration 1; table 1; bibliographies 3.

USSR UDC 546.92: 537.311: 536.531

TEMPERATURE DEPENDENCE OF RESISTANCE IN THE PL-2 PLATINUM USED IN INDUSTRIAL LOW-TEMPERATURE THERMOMETERS

Moscow IZMERITEL'NAYA TEKHNIKA in Russian No 4, 1977 pp 44-47

BELYANSKIY, L. B., DOTSENKO, V. V., RABUKH, L. I., DAN'KIV, T. S., and MAZALETSKAYA, G. L.

[Abstract] On the basis of experimental data the authors compute the standard temperature dependence of the relative resistance of PL-2 platinum in the temperature range 13.8-273.5K. The standard dependence $W^{st}(100)$ of relative resistance on temperature of the International Practical Temperature Scale for a thermometer with W(100) is 1.392597 where W(100) is the relative resistance of a thermometer at t=100°C. An analogous value W(100) for a thermometer with PL-2 platinum does not exceed 1.3916. By applying the computed standard dependence and by linear interpolation in the ranges 13.8-20.3K, 20.3-77K, and 77-273K, the authors obtain the temperature dependence of PL-2 theremometers as $1.3910 \leqslant W(100) \leqslant 1.3916$ with an error of 0.05K in the 13.8-90K range and 0.15K in the 900273K range. In this case the thermometers need be calibrated at only four points on the entire 13.8-273K scale. Illustrations 2; tables 4; bibliographies 7.

USSR UDC 662.997: 621.362.621.383

RADIATION STABILITY OF SILICON PHOTOELECTRIC TRANSDUCERS WITH ELECTRIC FIELD INCORPORATED IN THE BASE

Tashkent GELIOTEKHNIKA in Russian No 2, 1977 pp 3-8

GERASIMOVA, YE. M., GRIGOR'YEVA, G. M., and CHETVERIKOVA, G. A.

[Abstract] On the basis of fact that the limited service life of solar cells in space is caused by degradations resulting from the effects of high-energy protons and electrons, and the fact that the literature lacks data on the radiation stability of silicon drift photoelectric transducers during irradiation by protons, the authoresses studied the radiation stability of silicon photoelectric transducers with electric field in their base. Protons with energies of 6.3 Mev were used in vacuum. The temperature of the specimens during the irradiation did not exceed 30°C, and the intensity of the beam of protons was varied from 10^8 to 10^{11}prot/cm^2·sec. The dependence of the radiation stability of the transducers on the magnitude of the incorporated electric field was ascertained. It is shown that photoelectric transducers with incorporated electric field have higher radiation stability even with electrical field values of approximately 20 v/cm. Illustrations 5; bibliographies 7.

USSR UDC 662.997: 537.22.001.24

STUDY OF THE GEOMETRIC IMPROVEMENT OF STARTING-SHEET POLYURETHANE-FOAM REPLICAS FOR SOLAR CONCENTRATORS

Tashkent GELIOTEKHNIKA in Russian No 2, 1977 pp 25-29 manuscript received 9 Mar 1976

BAZAROV, B. A., KAPELYUSHNIKOV, V. M., and KALININ, B. A., Physico-technical Institute, Academy of Sciences Turkmen SSR

[Abstract] From hard polyurethane solid foams the authors obtained replicas by spraying on a standard parabolic mirror 1.5 m in diameter with 0.87-m focal length and 48° aperture. The efficiency and simplicity of the technology used makes the process feasible for producing a large number of polymer copies with diameters of 0.46 to 1.5 m. The research shows that the copies of solar concentrators obtained by the spraying of hard polyurethane foams duplicates its own standard with sufficient accuracy (0.8 to 0.98). The discrepancy in the dispersion angles does not exceed 0.1%. The use of the standard reflector considerably simplifies the process of measuring the geometric perfection of the prepared replicas, and allows them to be used as secondary standard without reflective coatings. For the reflective layers of solar concentrators prepared on the basis of polyurethane foams it is best always to use film coatings applied by the galvanic method. Illustrations 2; table 1; bibliographies 7.

USSR UDC 621.643

ON THE DETERMINATION OF THE NATURAL FREQUENCIES OF THE TRANSVERSE OSCILLATIONS OF UNDERGROUND PIPELINES OF ASBESTOS CEMENT PIPE

Tashkent IZVESTIYA AN UZ SSR SERIYA TEKHNICHESKIKH NAUK in Russian No 6, 1977 pp 36-39 manuscript received 17 Apr 1976

GOTOVTSEV, V. I., YERMOLAYEV, A. V., KHOZHMETOV, G. KH., and PUSHKIN, V. V., Institute of Mechanics and Seismic Stability of Structures, Academy of Sciences Uzbek SSR

[Abstract] The authors obtain experimentally the dynamic characteristics of the underground pipes and establish the theoretical premises for their study. The experiments were conducted at the Lyaur seismic test station of the Institute of Seismology and Seismic Stability of the Academy of Sciences Tadzhik SSR to determine the natural frequencies, period of the oscillations and decrement of decay for asbestos cement pipelines. VT-9 asbestos cement pipe with outside and inside diameters of 330 and 279 mm were layed with the top of the pipe 1.4 m below the surface of soil which at that depth had a specific weight of 1.53 t/m^3. There was a considerable difference between the amplitude and frequency of oscillations of the ground and of the pipe (38.4 Hz for ground and max of 57.4 Hz for one of three test pipes for frequency, but 0.5 and 0.57 logarithmic decrement of decay for the ground and the same pipe, respectively). It is found that in obtaining numerical values of the stresses generated in underground structures during earthquakes one should, in accordance with the seismodynamic theory of underground structures, use the values of their dynamic characteristics (period of natural oscillations, amplitude of oscillations) measured directly at the structures. In the absence of experimental data on the dynamic characteristics of pipelines, they must be determined theoretically; the accuracy of such values essentially depends on the coefficient of resistance of the ground. Illustrations 2; table 1; bibliographies 3.

USSR-BULGARIA UDC 772.93

SOME INVESTIGATIONS OF THE METHOD OF DEVELOPING ELECTROGRAPHIC IMAGES WITH THE USE OF THE CHARGED VAPORS OF DIELECTRICS

Moscow ZHURNAL NAUCHNOY I PRIKLADNOY FOTOGRAFII I KINEOMATOGRAFII in Russian No 3, 1977 pp 161-168 manuscript received 19 Nov 1975

ANTONOV, A., Physics Faculty, Sofia University; MARKOV, S., Higher Chemical-Technological Institute, Burgas; and YUSKESELIYEVA, L., Geophysics Institute, Bulgarian Academy of Sciences

[Abstract] A study is made of the possibility of developing electrographic images by means of charged particles of dielectrics (here aerosols from a film of polymethyl methacrylate) under the conditions of development with fine crystals and droplets formed in the vapors of the developer (ammonium chloride). A description is given for the device for determining electrographic images. Sulphur, camphor, rosin, and tobacco smoke were also as developers. The results obtained are illustrated and can be used in the study of the electrostatic charging of aerosols as well as to obtain electrographic images under conditions where the potential relief has areas with dimensions in microns and low charge density. Illustrations 8; table 1; bibliographies 5.

USSR UDC 536.431.2.081.089.68: 536.483

STATE SPECIAL STANDARD OF THE TKLR (TEMPERATURE COEFFICIENT OF LINEAR EXPANSION) UNIT IN THE 4.2-90K TEMPERATURE RANGE

Moscow IZMERITEL'NAYA TEKHNIKA in Russian No 4, 1977 pp 7-10

AGRANOVICH, YA. S., and ASTROV, D. N.

[Abstract] The special standard follows the general scheme established by the All-Union Scientific-Research Institute of Physicotechnical and Radiotechnical Measurements. Results are given of a certification of the standard with specimens of copper OSCh11-4 and fused quartz. An illustration is given of the arrangement of the specimens in the cryostat with platinum resistance thermometers for measuring the 13.81-273.15K range and for automatic regulation of temperature above 20K, a standard germanium resistance thermometer for measuring in the 4.2-20K range, and a germanium resistance thermometer used as a transducer for temperature regulation below 20K. The certification testing procedure is described. The results obtained differ by less than $1 \cdot 10^{-8} K^{-1}$ from the data of T. Rubin a.o. (J.American Chem. Soc., Vol 76, No 5, 1954), and by less than $3 \cdot 10^{-8} K^{-1}$ from data of White and Collins (J. Low Temp. Phys., Vol 7, No 1, 1972). Illustrations 2; tables 3; biblographies 18.

USSR UDC 621.317.313.081.1.089.68

STATE SPECIAL STANDARD INSTRUMENT FOR MEASURING THE UNIT OF INTENSITY OF A HIGH-FREQUENCY CURRENT AND ITS APPLICATION IN METROLOGICAL PRACTICE

Moscow IZMERITEL'NAYA TEKHNIKA in Russian No 4, 1977 pp 10-13

LOPAN', V. R.

[Abstract] A description is given of the standard measuring installation consisting of six sections: two electrodynamic ammeter sections, calibration photoammeter section with radial photoillumination, test transformer section with photocomparator, control-display console, and high-frequency current generator. The standard instrument measures currents in the 3-100-a range at frequencies of 0.1-100 MH_z; the mean square deviation of measured values S_o does not exceed $5 \cdot 10^{-4}$, and the systematic error θ does not exceed $8.5 \cdot 10^{-4}$. A description is given of the principle of operation. Illustrations 3; bibliographies 5.

USSR UDC 534.612.081.1.089.68-4

STATE SPECIAL STANDARD INSTRUMENT FOR MEASURING THE UNIT OF SONIC PRESSURE--THE PASCAL--IN WATER IN THE 0.01-1 HZ FREQUENCY RANGE

Moscow IZMERITEL'NAYA TEKHNIYA in Russian No 4, 1977 pp 13-17

GOLENKOV, A. N., GOLUB', S. G., LIKHACHEV, S. M., and FADEYEV, V. G.

[Abstract] The standard instrument was officially approved by GOSSTANDART USSR on 16 December 1976. It is based on a modification of the hydrostatic (variable-depth) method developed by the All-Union Scientific-Research Institute of Physicotechnical and Radiotechnical Measurements for calibrating hydrophones in the range below 1 Hz. The modified method utilizes mass forces generated in the oscillating medium in a gravity force field. The dynamic phenomena are not connected with the vibrating hydrophone, but are localized in the moving portion of the system where they can be computed precisely and readily controlled in experiments. The measurement chamber has two parts, one moveable and one immobile, both containing the fluid. They are joined by a flexible tube which permits vertical, uniform sinusoidal oscillations of the moveable part and of the free surface of the water in both parts as a whole. The total systematic error in calibrating hydrophones does not exceed $4.7 \cdot 10^{-2}$ and depends on the properties of the hydrophone. In the calibration of piezoceramic hydrophones with a sensitivity of approximately 150 microvolts per pascal the maximum mean square error does not exceed $0.2 \cdot 10^{-2}$, and does not exceed $0.1 \cdot 10^{-2}$ for most frequencies. Illustrations 4; bibliographies 15.

USSR

METHOD OF DETERMINING THE ERRORS OF THE DIAMETERS OF THE LIMBS OF INSTRUMENTS FOR MEASURING ANGLES

Author's Certificate 556314 (21) 2169144/10(22) 28 Aug 1975

Moscow OTKRYTIYA IZOBRETENIYA PROMYSHLENNYYE OBRAZTSY TOVARNYYE ZNAKI in Russian No 16, 1977 p 107

ALEKSEYEV, I. A., and YELISEYEV, S. V., Moscow Institute of Engineers of Geodesy, Aerophotography, and Cartography

[Text] A method of determining the errors of the diameters of the limbs of instruments for measuring angles consisting of a comparison by means of readout devices of the intervals of passage of the lines of a standard limb and the tested limb, respectively, which are attached to a single rotating axis, distinguished by the fact that, for the purpose of increasing the accuracy of measurement, when the standard limb is mounted on the rotating axis it is displaced relative to the tested limb by an angle greater than the limiting error

of the diameter, but less than the graduation of the tested limb, and, by rotation of the axis, a successive comparison of the intervals between the moment of passage of lines of the standard and lines of the tested limb through the sighting axis of the readout.

USSR UDC 771.537.33: 778.35

ON THE PROBLEM OF REDUCING THE INFLUENCE OF GRANULATION NOISE ON THE ERROR IN THE MEASUREMENT OF QUALITY CHARACTERISTICS OF AERIAL PHOTOGRAPHIC SYSTEMS

Moscow ZHURNAL NAUCHNOY I PRIKLADNOY FOTOGRAFII I KINEMATOGRAFII in Russian
No 3, 1977 pp 199-204 manuscript received 17 Jun 1975

KOROLEVA, V. P., MEL'KANOVICH, A. F., and VASIL'YEV, G. P.

[Abstract] Theoretical and experimental studies are described for three methods of measuring the dispersion function and frequency transfer functions of photographic systems on the basis of the images of brightness discontinuities and bright lines distorted by the granulation noise of the photographic film. The methods are based on the use of apriori information on the photographic system and produce a nonlinear filtration of the noise. The first two methods obtain an approximation of the dispersion function of the aerial photographic system with the expression

$$g(x) = \frac{2:3}{np} \exp\left[-4.6\left|\frac{x-a}{p}\right|^{n}\right],$$

where p and n are the parameters and a is the abscissa of the point of maximum dispersion function. The third method is based on a smoothed transition curve of functions of an essentially more general type, which widens the sphere of photographic systems to which this method may be applied. However, in spite of the universality of the third method, in those cases when it is known that the dispersion function is symmetrical, the second method may give better results because the limit on the determination of the noise of the third method will result, as a rule, in a nonsymmetrical dispersion function and, consequently, a phase-frequency characteristic that is non-zero. Illustration 1; tables 2; bibliographies 10.

USSR UDC 629.7.058.47

COMPARATIVE ESTIMATE OF THE DETERMINATION OF THE ANGULAR COORDINATES OF A FLIGHT VEHICLE BY GYROSCOPIC AND ASTRONOMICAL MEANS

Leningrad IZVESTIYA VUZOV PRIBOROSTROYENIYE in Russian No 11, 1976 pp 71-75
manuscript submitted 19 May 1976

SERGEYEV, M. A., BUGROV, YE. A., LEONOV, V. N., and YUSHCHENKO, V. I., Leningrad Institute of Precision Mechanics and Optics

[Abstract] Results are given of a measurement of the angular coordinates of a flight vehicle by a gyroscopic instrument and a navigation system with star corrections. It is shown that the angular oscillations of the vehicle in the low-frequency region of the spectrum are for all practical purposes not measured by the gyroscopic system, but are determined by the navigational system with star corrections. For this reason the navigation system with star corrections is not only better suited for studying the motion of a flight vehicle relative to its center of mass, but also for analyzing the errors of gyroscopic instruments. The combination of the star-correction navigational system and digital computer provides the possibility of more accurate instruments for determining the actual motions of an object with respect to angular coordinates and for measuring the errors of instruments that give the angular coordinates of the axes of a moving vehicle. Illustrations 3; biblographies 5.

USSR UDC 620.178.311.81

CREEP-LIMIT TESTING OF SPECIMENS WITH A FATIGUE CRACK

Moscow ZAVODSKAYA LABORATORIYA in Russian No 1, 1977 pp 95-98 manuscript received 22 Dec 1975

NESHPOR, G. S., MIKLYAYEV, P. G., VOROB'YEV, N. A., and KURAKINA, G. D.

[Abstract] A comparison is made of the results of creep-limit tests of specimens of the aluminum alloy AMg6 with a notch and with a notch plus a prepared fatigue crack at the notch. It is shown that the creep limit of specimens with the prepared fatigue crack may give valuable information on the materials tested and for this reason can be recommended as an additional procedure in the testing of notched specimens. The 25-mm AMg6 aluminum specimens were necked to approximately 14 mm and further notched to approximately 11 mm diameter; those with the fatigue crack were narrowed an additional 1.5 mm by the crack. The specimens were subjected to repeated tensile loads of 100-500 kg. Data are tabulated for 20 mechanical properties of five heat treatments of specimens. Illustrations 2; table 1.

USSR UDC 620.173

RADIAL COMPRESSION AS A METHOD OF MECHANICAL TESTING

Moscow ZAVODSKAYA LABORATORIYA in Russian No 1, 1977 pp 98-100 manuscript received 22 Dec 1975

SEDOKOV, L. M., MARTYNENKO, A. G., and SIMONENKO, G. A., Tomsk Polytechnic Institute

[Abstract] It is shown that a detailed explanation is required for the indirect method of determining the ultimate tensile strength of brittle materials on the basis of the results of radial compression of cylindrical specimens. By using the strength criterion most reliable for brittle materials in plane stress, the authors derive a theoretical equation for the conversion factor A. Results are given of additional experiments which confirm the high degree of reliability of this equation. Some practical recommendations are proposed for applying the method of radial compression. For many materials the consistency of the test results by radial compression is greater than by direct tensile testing by a factor of 1.5 to 2.0. Illustrations 4; biblographies 5.

USSR

UDC 669.14-419.4: 620.174.251.2

MEASURING THE BENDING OF BIMETALLIC SHEETS DURING HIGH-TEMPERATURE HEATING

Moscow ZAVODSKAYA LABORATORIYA in Russian No 1, 1977 pp 102-103 manuscript received 12 Jan 1976

MASLOV, A. M., USTIMENKO, V. A., BYKOV, A. A., CHERVYAKOV, V. V., TKACHEV, A. V., and VEREVKIN, A. N., Central Scientific-Research Institute of Ferrous Metallurgy, Moscow

[Abstract] An illustration and description are given of an apparatus for measuring the bending of bimetallic sheets as a result of heating in a vacuum at temperatures of 20-1, 200°C. The base layer of the sheets was low alloyed steel and the surface layer was 12Kh18N10T stainless. The curves plotted for the dependence of the degree of bending on the temperature of heating and cooling have an S-shape. The experimental data are in good agreement with theory. The specimens were placed in the horizontal position and clamped at one end so that they could bend freely upward or downward with the heating or cooling. The dimensions of the specimens were 1 X 10 X 110; 2.5 X 10 X 110, and 12 X 20 X 110 mm. The thickness of the stainless outer layer was 30% of the entire thickness of the bimetallic specimen. The bending was measured every 100°C. During heating from room temperature to 600-700°C the bending increments are approximately uniform. Increasing temperature to 900-1,000°C is accompanied by increased bending increments, apparently associated with phase transitions in the base layer metal. The curves of the variation of bendings during cooling and heating do not coincide. The graphic thus resembles a hysteris loop. With increased heating temperature and number of cycles of heating and cooling residual deformation increases. Illustrations 2; bibliographies 4.

USSR UDC 532.5.071.4: 621.224 - 253

CHARACTERISTICS OF THE TURBULENCE OF THE FLOW IN A TURBINE CASCADE WITH BLOWING INTO THE RIM

Moscow IZVESTIYA AN SSSR ENERGETIKA I TRANSPORT in Russian No 2, 1977 pp 168-172 manuscript received 18 Dec 75 revised 22 Jan 1976

KOPELEV, S. Z., and LIKHERZAK, YE. YE.

[Abstract] Results are given of an experimental study of the turbulent structure of the flow in a turbine cascade and behind its leading edge in the presence of blowing into the rim wake through slots in the outlet edges. The measurements were made with pneumosonds and thermoanemometers. Data are given on the parameters that characterize the mean velocity field, the intensity of the turbulence, frequency spectrum of the oscillations in the core flow and wake at various blowing rates. The strong influence of the blowing on the structure of the rim wake and particularly on the intensity of turbulent fluctuations in the wake and extent of the region of recirculation is shown. The characteristics of the near wake behind the blade edge change in both the faired and turbulent parameter even at comparatively low blowing rates but are commensurate with the flow rate of air entrained into the viscous wake. With increased blowing, the intensity and energy of the turbulent pulsations in the wake drop abruptly. Illustrations 3; bibliographies 4.

USSR UDC 629.113: 621.43

START-UP PERFORMANCE CHARACTERISTICS OF THE YAMZ-740 AND YAMZ-741 DIESELS

Moscow AVTOMOBIL'NAYA PROMYSHLENNOST' in Russian No 5, 1977 pp 7-9

GORYUNOV, V. G., DEMIDOV, G. F., KHRESTIN, N. A., KVAYT, S. M., PETROV, V. A., and CHIZHKOV, YU. P., Scientific-Research and Experimental Institute of Automobile Electrical Equipment, Carburators and Instruments

[Abstract] Results are given of start-up tests of the YaMZ-740 and YaMZ-741 diesels at temperatures down to minus 40°C and show that the use of an electric heater and an increase of the gear ratio at the contact of the starter gear and flywheel starter ring from 9.9 to 11.3 are effective means of improving start up. The increased gear ratio brought a 9-14% reduction (50-75 amps) in the current required for a start at -15°C for the YaMZ-740 and an 8-12% reduction (55-85 amps) for the YaMZ-741 engine. At lower temperatures the influence of an increased gear ratio was even greater. At -30°C the engine crankshaft rpm increased 48%, and the starter current dropped from 1,005 to 850 amps (15.5%) in the YaMZ-741 engine test. In the YaMZ-740 the crankshaft rpm increased 5% at -30°C, and the starter current dropped from 680 to 610 amps, or 10%. The authors recommend that the higher gear ratio be introduced into production. Illustrations 3; tables 4; bibliographies 5.

USSR UDC 620.179.16

DEVICE FOR HIGH-TEMPERATURE ULTRASONIC INSPECTION

Moscow OTKRYTIYA IZOBRETENIYA PROMYSHLENNYYE OBRAZTSY TOVARNYYE ZNAKI in Russian No 17, 1977 Author's Certificate No 557313 filed 28 Jul 1975 p 143

KOKSHAROV, V. D., SAYPEYEV, G. A., MALYUTIN, A. A., and ZABOLOTSKAYA, R. M., Eastern Scientific-Research and Design Institute of the Refractories Industry

[Text] For high-temperature ultrasonic inspection, a device containing, in tandem, a sounding pulse generator, illuminator, transmitting and receiving delay lines, receiver and indicator with jacket cooling, distinguished by the fact that, for the purpose of increasing the measurement accuracy during inspection of materials in an oxidizing medium, the ultrasonic delay lines are made of a single crystal of a highly refractive mineral such as ruby.

USSR

ACOUSTICAL AUTOCORRELATOR

Author's Certificate (11)556448 (21) 2018006/09 (22) 15 Feb 74

Moscow OTKRYTIYA IZOBRETENIYA PROMYSHLENNYYE OBRAZTSY TOVARNYYE ZNAKI in Russian No 16, 1977 p 138

BONDARENKO, V. S., IVANOV, P. G., and PLUZHNIKOV, V. M.

[Text] An acoustic autocorrelator containing a piezoelectric sonic waveguide of rectangular cross section, input and output transducers of the surface acoustic waves attached to the working surface of the sonic waveguide, distinguished by the fact that, for the purpose of reducing the level of the spurious signals, the end of the piezoelectric sonic waveguide is terminated in an acute angle to the working surface and on it are attached the transducers of the longitudinal acoustic body waves.

USSR

UDC 531.715.27

ANGLE OF ROTATION PICKUP

Moscow OTKRYTIYA IZOBRETENIYA PROMYSHLENNYYE OBRAZTSY TOVARNYYE ZNAKI in Russian No 17, 1977 p 131 Author's Certificate No 557260 filed 19 Dec 1975

ZARIPOV, M. F., NIGMATOV, N. T., SULEYMANOV, N. T., GINIYATULLIN, N. I., and KALINCHUK, N. N., Ufa Aviation Institute

[Text] An angle of rotation pickup containing, in tandem, a light source, rotation angle to light signal transducer in the form of a semitransparent cylinder, photocell and unit for processing the signals from it, distinguished by the fact that, for the purpose of simplifying the design and of broadening the functional possibilities of the pickup, on the surface of the cylinder are two profiled masks, one reflecting, the other absorbing.

USSR UDC 531.383

ON THE USE OF STEREOGRAPHIC PROJECTION FOR COMPUTING THE STATIC CHARACTERISTIC OF A ROTOR-MASK ANGLE PICKOFF OF A TWO-DEGREE-OF-FREEDOM GYROSCOPE

Leningrad IZVESTIYA VUZOV PRIBOROSTROYENIYE in Russian No 11, 1976 pp 75-78
manuscript received 14 July 1976

SHURSHALOV, V. N., and VORONOV, S. A., Saratov Polytechnic Institute

[Abstract] A graphical-analytical method is proposed for determining the limits of the active portions on the surface of a spherical rotor, and a calculation is made of the lengths of the output pulses of the rotor-mask attitude sensors of two-degree-of-freedom gyroscopes. The method is based on the use of stereographic projection. The method is particularly useful in cases when the static characteristics of the rotor-mask attitude sensor are nonlinear. Formulas are given for plotting the stereographic projection of the limits of the active zone on a given surface of the casing. Two beams from the center of the spherical rotor pass through the intersection of the stereographic projections of the active portion of the rotor and a circle formed by a central angle. A formula is given which is used to apply the central angle to determine the length of the output pulses for each value of the given angle of rotor deviation from the position of the casing. Illustrations 2; bibliographies 6.

USSR

DIFFRACTION MONOCHROMATOR

Author's Certificate (11) 556347 (21) 2179667/25 (22) 10 Nov 75

Moscow OTKRYTIYA IZOBRETENIYA PROMYSHLENNYYE OBRAZTSY TOVARNYYE ZNAKI in Russian No 16, 1977 p 115

AFANAS'YEV, V. V., and STARTSEV, G. P.

[Text] A diffraction monochromator with deflection angle not over 45° containing a concave diffraction grating, fixed inlet and outlet slots and spectrum scanning mechanism that rotates the grating around the vertical axis which passes through its apex, distinguished by the fact that, for the purpose of reducing the defocusing and aberrations, the distance from the center of the diffraction grating to the inlet slot is equal to 0.9-1.1 the radius of curvature of the grating, and the diffraction grating is designed with variable distance between neighboring lines, the variation in accordance with linear law, whereby the spacing coefficient is selected from the condition of minimum defocusing.

USSR UDC 681.121

GAS FLOWMETER

Moscow OTKRYTIYA IZOBRETENIYA PROMYSHLENNYYE OBRAZTSY TOVARNYYE ZNAKI in Russian No 17, 1977 p 133 Author's Certificate No 557270 filed 9 Oct 1972

VOYTSEKHOV, YU. R., and CHERNYAKOVA, M. .

[Text] 1. Gas flowmeter containing a double breakdown pulse generator, discharger with two electrodes, and a device for recording the displacement of the repeated electrical breakdown, distinguished by the fact that, in order to increase the precision of measurement, one of the electrodes of the discharger is in the form of a calibrated wire loop, the arms of which are symmetrical with the other electrode with respect to resistance, and, for recording the displacement of the repeated electrical breakdown, a device connected to the loop electrode and containing a transformer with two opposite-phase current windings and test winding terminated in a tester.
2. Flowmeter according to 1., distinguished by the fact that the device for recording the displacement of the repeated electrical breakdown contains an additional transformer, the current windings of which are in phase synchronism, and the test windings of both transformers terminate in a ratiometer.

USSR UDC 536.521.08

PYROMETER FOR MEASURING THE TEMPERATURE OF THE BLADES OF A GAS TURBINE ENGINE

Moscow OTKRYTIYA IZOBRETENIYA PROMYSHLENNYYE OBRAZTSY TOVARNYYE ZNAKI in Russian No 17, 1977 Author's Certificate No 557272 filed 19 Mar 1975 pp 133-134

LEONT'YEV, K. L., TSVETKOV, V. A., TSINSKIY, S. S., and MAKUKH, A. A.

[Text] A pyrometer for measuring the temperature of the blades of a gas turbine engine containing a temperature pickup, time selector, measuring device, beam splitter, and thermal radiation gradient sensor, distinguished by the fact that, in order to improve measurement accuracy, it has two slaved linearly increasing voltage generators, a maximum voltage value clamping circuit and comparator, whereby the input of one of the generators is connected to the output of the thermal radiation gradient sensor, and the output is connected to the input of the maximum voltage value clamping circuit, the output of which is connected to one of the inputs of the comparator, whereas the synchronizing input and output of the second generator are connected, respectively, to the synchronizing output of the clamping circuit and second input of the comparator, the output of which is connected to the trigger input of the second generator and second input of the time selector.

USSR UDC 550.834

MULTICHANNEL SYSTEM FOR SEISMIC RESEARCH AT SEA

Moscow OTKRYTIYA IZOBRETENIYA PROMYSHLENNYYE OBRAZTSY TOVARNYYE ZNAKI in Russian No 18, 1977 p 107 Author's Certificate No 558236 filed 6 Jun 1975

MEYER, V. V., ZHELUDKOV, N. I., TARAKANOV, A. V., GARKALENKO, I. A., and SHISHANOV, G. V.

[Text] 1. A multichannel system for seismic research at sea containing in the towed section an acoustic generator, code transmission line, linear synchronization line, and, in each channel, a seismic signal encoder consisting of a series-connected seismic sensor and analog-to-digital converter, and, in the on-board section, a synchronous generator, receiving shift register and recorder, distinguished by the fact that, for increased reliability of the code transmission and reception, the on-board part of the system contains a code correction device connected between the recorder and receiving shift register, a programming device connected through the pulse shaper to the acoustic generator, a servo autosynchronizer connected between the signal and control inputs of the receiving shift register and, in the towed section, each seismic signal encoder is additionally connected to a cyclic code translator; the two lines are separated according to the number of signals at cutoff and between them in the code transmission line is an OR circuit, and in the synchronization line a delay line and pulse shaper, whereby the output of each circuit is connected to the timing input of the analog-to-digital converter,

and the input of each is connected to the trigger input of the cyclic code translator, the output of which is connected to the input of the OR circuit.
2. A system in accordance with 1., distinguished by the fact that the code correction device is in the form of a correction adder to which is connected the secondary input of the correction memory in the form of a shift register shorted to the feedback loop through the primary pulse input of a push-pull rectifier, the secondary pulse input of which is connected to the output line of the code transmitter, and the strobing inputs are connected to the outputs of the programming device.
3. A system in accordance with 1. and 2., distinguished by the fact that a servo synchronizer is incorporated as a series connection of a marker pulse discrimination circuit and impact excitation pulse generator to the control inputs of the shift register.

USSR UDC 550.834

DEVICE FOR ANALYZING SEISMIC VIBRATIONS

Moscow OTKRYTIYA IZOBRETENIYA PROMYSHLENNYYE OBRAZTSY TOVARNYYE ZNAKI in Russian No 18, 1977 pp 107-108 Author's Certificate No 558237 filed 13 Feb 1974

ANTONOV, R. O., KRAS', D. P., PESKOV, V. I., TRISHCH, G. G., CHERKASSKIY, N. V., SHVETSKIY, B. I., RAPOPORT, M. B., RYZHENKOV, V. N., RYBINKIN, L. A., GIL'BERSHTEYN, P. G., ALFEROV, V. V., YUNERMAN, L. SH., KAPLAN, S. A., LIKHTEROV, E. B., MALINSKIY, S. A., RYBAKOV, L. A., TROYANOVSKIY, V. V., and AYZMAN, YU. A., L'vov Polytechnic Institute, Moscow Institute of the Petrochemical and Gas Industry, Central Geophysical Trust, and Moscow "Neftepribor" Works

[Text] Device for analyzing seismic vibrations containing input and output data registers, multiplier, adder, output address register, operation code register connected to the control unit, registers of real-time addresses of the massifs and registers of initial massif addresses whose inputs are connected to the outputs of the cycle counter, operation code register, register of the number of operations in a cycle and to the output of the input register, distinguished by the fact that, for the purpose of increasing the data processing rate for a seismic survey, the system includes four units of magazine-type registers, an intermediate register, a scale mask, and an address increment control circuit, whereby the input of the first unit of the magazine, type registers, included in the feedback loop, is connected to the output of the input data register, and its output is connected to one of the adder outputs and, through the second unit of magazine-type registers, is connected to one of the inputs of the multiplier, the other input being connected to the output of the input data register through a third unit of magazine-type registers included in the feedback loop, and the output is connected through the intermediate register to a second input adder; the input of the fourth unit of magazine-type registers is connected to the output of the adder, and its output through the scale mask is connected to the output data register; the counter inputs of the real-time-address and initial-address registers are connected

to the input of the cycle counter and output of the address increment control circuit; the remaining inputs of the real-time-address and initial-address registers are connected to the output of the number-of-operations-in-a-cycle register, and the outputs of the initial-address registers are connected through the real-time-address register to the input of the address register.

USSR UDC 550.830

DEVICE FOR INDICATING A GIVEN POSITION OF THE MOVING INDEX OF A GRAVIMETER

Moscow OTKRYTIYA IZOBRETENIYA PROMYSHLENNYYE OBRAZTSY TOVARNYY ZNAKI in Russian No 18, 1977 p 108 Author's Certificate No 558238 filed 4 Feb 1975

IGNAT'YEV, O. N., and KAPUSTKIN, V. V., Scientific-Production Association "Geofizika"

[Text] Device for indicating a given position of the moving index of a gravimeter including a lamp, optical projection system, mask connected to the index, a screen with window and photocell, distinguished by the fact that, in order to increase the accuracy of indication, the focal length (f) of the optical projection system, the linear dimension (h) of the mask, linear dimension (K) of the window, and distance (g_1) from the optical center of the projection system to the screen is selected from the condition

$$\frac{f}{f - g_1} = \frac{h}{K - n\lambda}$$

where n is an arbitrary integer greater than unity; and λ is the wavelength of the incident light.

USSR UDC 621.317.001.12 + 621.318.1.001.12

STATUS AND PROMISE OF DEVELOPMENT OF THE PRODUCTION OF MEASURING DEVICES FOR THE PARAMETERS OF MAGNETIC FIELDS AND MAGNETIC MATERIALS

Moscow METROLOGIYA in Russian No 4, 1977 pp 3-16

KOVAL'CHUK, L. V., ORESHNIKOV, V. V., SKORODUMOV, S. A., SEMENOV, N. M., and TRET'YAKOV, L. M.

[Abstract] Tables are given showing the parameters of the two galvanometric Hall-generator-type meters and the one radiospectroscopic NMR-type meter now series produced and the two magneto-modulation-type and the six Hall-generator-type galvanomagnetic instruments to be series-produced in coming years as products of the planned joint efforts of the All-Union Scientific-Research Institute of Electrical Measuring Instruments and the manufacturing plant "Elektroizmeritel'." Measurements of the magnetic induction of the magnetic fields of 10 Tesla and over in the temperature range of minus 271 to plus 70°C are expected. An improved measuring instrument for hard magnetic materials is expected to go into production in 1978. The manufacturing plant, "Tochelektropibor," has begun production of a digital ferrometer (F5063) for determining the maximum values of the magnetic induction and field intensity of a magnetic field in the frequency range of 25 to 10,000 Hz and parameters of the hysteresis loop in the range of 50 to 1,000 Hz. The measurement error is computed at $\pm$ 0.01 + 0.001. Tables 7; bibliographies 16.

USSR UDC 621.317.42: 621.318.1/2

MAGNETIC MEASURING INSTRUMENTS AND INSTALLATIONS FOR TESTING THE QUALITY OF MAGNETIC SYSTEMS, FERROMAGNETIC MATERIALS AND PERMANENT MAGNETS

Moscow METROLOGIYA in Russian No 4, 1977 pp 37-51

SHIKHIN, A. YA., KOMAROV, YE. V., and SERGEYEV, V. G.

[Abstract] The Laboratory for Problems of Permanent Magnets at the Moscow Power Engineering Institute (MEI) has produced a number of devices for automatic recording of coordinate components (topography) of the magnetic field of various types of systems with permanent magnets. The UKT-3U device automatically records the topography of the magnetic field of magnetic focussing systems with axial symmetry both at normal temperature as well as in the range of -60 to +125°C. The UKT-4pm instrument tests the external topography of the field of permanent magnets and PM systems with plane parallel field. It measures the components of magnetic induction from $\pm$2 to $\pm$500 mT. The UKT-5tss automatically records the topography of the stray field of magnetic systems of cylindrical or spherical configuration. The UKT-60 records the topography of the magnetic field along the axis of miniature periodic magnetic recording systems by measuring and recording the distribution of the axial and radial

components of the field induction. It measures in the range of ±10 to ±500 mT with a 1.0% error. The MIS-1M tests the parameters of soft magnetic materials of small size and permanent magnets. Test length 4-10 mm, cross section 2-200 mm^2; max electromagnet field intensity 2,000 kA/m. The MIS-1N tests the parameters of hard magnetic materials by a method of gradual variation of the external field. It handles annular specimens with 30-mm inside diameter and 0.2-cm^2 cross section with magnetizing current of 15 a. The TsIMI-6 instrument measures induction up to 1,000 Hz of magnetic fields from ±0.1 to ±1,000 mT, has a digital readout and a measurement error of ±5% at the ±0.1mT limit and ±2.5% at the ±1,000-mT limit. Illustrations 3; bibliographies 7.

USSR

NOZZLE FOR INJECTING FUEL INTO AN INTERNAL COMBUSTION ENGINE

Author's Certificate 556235 (21) 1968086/06 (22) 22 Oct 73

Moscow TOKRYTIYA IZOBRETENIYA PROMYSHLENNYYE OBRAZTSY TOVARNYYE ZNAKI in Russian No 16, 1977 pp 87-88

PERSHIN, P. P., Khar'kov Aviation Institute

[Text] 1. Nozzle for injecting fuel into an internal combustion engine, containing a hollow housing with mixing chamber, and inside the housing a fuel injection pipe with needle valve and conical tab and fuel nozzle positioned around the conical tab and connected with the mixing chamber, distinguished by the fact that for the purpose of enhancing the atomization of the fuel and of reducing the expenditure of gas the nozzle is executed as a divergent type in the direction of the mixing chamber with a cone angle of 5-30°. 2. Nozzle according to 1., distinguished by the fact that the surface of the nozzle is executed with spiral grooves.

USSR

ROTOR BLADE OF A TURBOMACHINE

Author's Certificate No 556222 (21) 2323722/06 (22) 17 Feb 76

Moscow OTKRYTIYA IZOBRETENIYA PROMYSHLENNYYE OBRAZTSY TOVARNYYE ZNAKI in Russian No 16, 1977 pp 84-85

TIKHONOV, N. T., Kuybyshev Aviation Institute

[Text] Blade of the rotor of a turbomachine, preferably of a turbine, the chute of which is configured as an arc of a circle and on the back of which is a hollow oriented along the blade axis, distinguished by the fact that for the purpose of increasing the reliability of the turbomachine by reducing the maximum rpm at idle, the hollow cavity is positioned at a distance which is 35-45% of the blade width from the inlet edge and executed along the arc of the circle with a radius 0.95 - 1.05 the radius of the chute.

USSR

DEVICE FOR COOLING THE DISK OF A TURBOMACHINE

Author"s Certificate No 556221 (21) 2190475/06 (22) 20 Nov 75

Moscow OTKRYTIYA IZOBRETENIYA PROMYSHLENNYYE OBRAZTSY TOVARNYYE ZNAKI in Russian No 16, 1977 p 84

KAPUSTIN, N. K., and TRUSHIN, V. A., Ufa Aviation Institute

[Text] A device for cooling the disk of a turbomachine, preferably a gas turbine, containing fixed guides for preliminary swirling of the cooling air, a baffle attached to the disk with centripedal blades on the inside surface forming, together with the surface of the disk, an annular cavity that is connected at the inlet ports with the guide vane apparatus and at the outlet with openings running through the disk, distinguished by the fact that, for the purpose of increasing the efficiency of the cooling, there is at the outlet from the through holes a centrifugal blade lattice, the blading of which is set at an angle of 20-35° to the direction of motion of the rotating disk.

USSR

HYDROSTATIC STEP BEARING

Author's Certificate No 557214(21)1919872/6(22) 28 May 73

Moscow OTKRYTIYA IZOBRETENIYA PROMYSHLENNYYE OBRAZTSY TOVARNYYE ZNAKI in Russian No 17, 1977 p 120

ANTONOV, O. N., and LEVIN, V. A., Ufa Aviation Institute

[Text] 1. Hydrostatic step bearing, preferably as a support for gas turbine engines, containing a case, bearing mounted shaft within the case, a vertical journal with peripheral seal rigidly attached to the shaft, operating chambers on both sides of the vertical journal with channels for supplying fluid, and sleeve-valve distributor for regulating pressure in the chambers, distinguished by the fact that, for the purpose of increasing the reliability of the step bearing, the sleeve-valve distributor is designed as projections on both sides of the vertical journal with flat keyways which interact with the moveable ring-shaped seals of the case.
2. Hydrostatic step bearing in accordance with No 1., distinguished by the fact that it has two differential seals, and, on both sides of the ridge of the vertical journal, antifriction packing inserts with radial grooves alternately pointing in opposite directions.

USSR UDC 621.165

FLOW SECTION OF AN AXIAL TURBOMACHINE

Moscow OTKRYTIYA IZOBRETENIYA PROMYSHLENNYYE OBRAZTSY TOVARNYYE ZNAKI in Russian No 20, 1977 p 95 Author's Certificate No 560070 filed 21 Mar 1975

SANDOVSKIY, V. B., MOZGOV, N. N., and KHRABROV, P. V.

[Text] Flow section of an axial turbomachine, preferably a steam turbine, containing a two-layer stage with rotor blade separating partition piece and, on it, the diaphragm sealing ring of the previous stage and radial seal between the partition piece and sealing ring, distinguished by the fact that, for the purpose of enhancing the efficiency, above the ring and parallel to it is a baffle, and the cavity between the baffle and the ring is connected to the intermediate part of the seal.

CSO: 1861 - END -